

Language, culture & cognition

Language, Space and Social Relationships

A Foundational Cultural Model
in Polynesia

Giovanni Bennardo



This page intentionally left blank

Language, Space, and Social Relationships

The study of the relationship between language and thought, and how this apparently differs between cultures and social groups, is a rapidly expanding area of inquiry. In this book Giovanni Bennardo discusses the relationship between language and the mental organization of knowledge, based on the results of a fieldwork project carried out in the Kingdom of Tonga in Polynesia. It challenges some existing assumptions in linguistics, cognitive anthropology and cognitive science and proposes a new foundational cultural model, 'radiality', to show how space, time, and social relationships are expressed both linguistically and cognitively. A foundational cultural model is knowledge that is repeated in several domains and shared within a culturally homogeneous group. These knowledge structures are lenses through which we interpret the world and guide our behavior. The book will be welcomed by researchers and students working within the fields of psycholinguistics, anthropological linguistics, cognitive anthropology, cognitive psychology, cross-cultural psychology, and cognitive science.

GIOVANNI BENNARDO is Associate Professor in the Department of Anthropology at Northern Illinois University.

Language, culture and cognition

Editor Stephen C. Levinson, Max Planck Institute for Psycholinguistics

This series looks at the role of language in human cognition – language in both its universal, psychological aspects and its variable, cultural aspects. Studies will focus on the relation between semantic and conceptual categories and processes, especially as these are illuminated by cross-linguistic and cross-cultural studies, the study of language acquisition and conceptual development, and the study of the relation of speech production and comprehension to other kinds of behaviour in a cultural context. Books come principally, though not exclusively, from research associated with the Max Planck Institute for Psycholinguistics in Nijmegen, and in particular the Language and Cognition Group.

- 1 Jan Nuyts and Eric Pederson (eds.) *Language and Conceptualization*
- 2 David McNeill (ed.) *Language and Gesture*
- 3 Melissa Bowerman and Stephen C. Levinson (eds.) *Language Acquisition and Conceptual Development*
- 4 Gunter Senft (ed.) *Systems of Nominal Classification*
- 5 Stephen C. Levinson *Space in Language and Cognition*
- 6 Stephen C. Levinson and David Wilkins (eds.) *Grammars of Space*
- 7 N.J. Enfield and Tanya Stivers (eds.) *Person Reference in Interaction: Linguistic, cultural and social perspectives.*
- 8 N.J. Enfield *The Anatomy of Meaning: Speech, gesture, and composite utterances*
- 9 Giovanni Bennardo *Language, Space, and Social Relationships: A foundational cultural model in Polynesia*

Language, Space, and Social Relationships

A Foundational Cultural Model in Polynesia

Giovanni Bennardo

Northern Illinois University



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521883122

© Giovanni Bennardo 2009

This publication is in copyright. Subject to statutory exception and to the provision of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published in print format 2009

ISBN-13 978-0-511-53700-4 eBook (Adobe Reader)

ISBN-13 978-0-521-88312-2 hardback

Cambridge University Press has no responsibility for the persistence or accuracy of urls for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

For Katie and Maya, Lucio, Matteo

Contents

<i>List of figures</i>	page x
<i>List of tables</i>	xiii
<i>Preface</i>	xv
<i>Acknowledgments</i>	xix
<i>List of abbreviations</i>	xxiii

1	A foundational cultural model in Tongan language, culture, and social relationships	1
1.1	Introduction	1
1.2	Why Tonga?	2
1.3	The architecture of the mind and its internal working structure	4
1.4	A blended approach to cognition	8
1.5	Cultural models	10
1.6	A foundational cultural model	12
1.7	Polynesian selves and cognition	13
1.8	Methodological issues	15
1.9	Synopsis	17
2	The Kingdom of Tonga: country, people, and language	20
2.1	Where is Tonga?	20
2.2	Tongan society and culture	21
2.3	Tongan language	28
2.4	Three major field sites	31

Part I: Space in Tongan language, culture, and cognition

3	Space in Tongan language	41
3.1	Language for space in Tonga	41
3.2	Methodology for the collection of the linguistic data	44
3.3	The Tongan linguistic data	47
3.4	Assigning 'front' to cultural objects	77
3.5	Conclusion: language and space in Tonga	85
4	Space in Tongan cognition	88
4.1	Thinking about space	88
4.2	Methodology for the collection of the cognitive data	88

4.3	Uses of frames of reference elicited by the FoR tasks	95
4.4	Conclusion: Tongan spatial cognition	104
5	Tongan culture and space	105
5.1	Culture and space	105
5.2	The Tongan cultural milieu	106
5.3	The cultural root of the new psychological tasks	111
5.4	The 'culture' subset of the psychological tasks	116
5.5	Map drawing tasks: the Tongan 'radial' representation of space	117
5.6	Memory tasks: a 'cultural' absolute frame of reference	131
5.7	Exchange patterns: spatial cognition in the behavioral place	154
5.8	Conclusion: Tongan culture and spatial cognition	168

Part II: Radiality

6	The radiality hypothesis	173
6.1	Radiality	173
6.2	Radial organizations in the representations of spatial relationships	175
6.3	Radial organizations and traditional knowledge domains	187
6.4	Conclusion	190
7	Radiality in possession and time	191
7.1	Radiality and possession	191
7.2	Radiality and time	198
7.3	Conclusion	202
8	Radiality and the Tongan kinship terminology	204
8.1	Introduction	204
8.2	Tongan social life and kinship	205
8.3	The Tongan kinship terminology	208
8.4	Conceptual basis for kinship space	210
8.5	Algebraic analysis of the generative logic for the Tongan kinship terminology	215
8.6	Tongan social life and kinship terminology revisited	233
8.7	Conclusion	237

Part III: Radiality in social relationships

9	Radiality and speech about social relationships	243
9.1	Introduction	243
9.2	Investigating social relationships	244
9.3	The lexical frequency analysis (<i>mai-atu</i>)	253
9.4	The metaphor analysis	263
9.5	The discourse structure analysis	283
9.6	Conclusion	285
10	Radiality and mental representations of social relationships	287
10.1	Introduction	287
10.2	The memory task (free listing)	288

10.3	The pile sort task	295
10.4	The drawing task	299
10.5	Conclusion	307
11	Radiality in social networks	309
11.1	Introduction: why social networks?	309
11.2	The social structure of a Tongan village	310
11.3	Methodology	313
11.4	Hypotheses about forms and types of social networks	317
11.5	<i>Kāinga</i> structures in the village	318
11.6	Results of the social network analysis	320
11.7	Results of correlations	332
11.8	Conclusion	338
12	A radial mind	339
12.1	The Tongan radial mind	339
12.2	Three emerging proposals	340
12.3	Final remarks	346
	<i>References</i>	348
	<i>Author Index</i>	365
	<i>Subject Index</i>	368

Figures

1.1 Jackendoff's architecture of cognition	page 5
1.2 Jackendoff's revised architecture of cognition	6
2.1 Map of the Pacific Ocean	20
2.2 Map of the Kingdom of Tonga	22
2.3 The Vava'u group	33
2.4 Detail of the village of Houma	33
2.5 The southern archipelago of Tongatapu with the capital town of Nuku'alofa and the village of Ngele'ia	35
2.6 The island of Niuaupoutapu with the village of Hihifo	37
3.1 The basic relative frame of reference and its two subtypes	59
3.2 The intrinsic frame of reference	60
3.3 Man and Tree, Set 2, photo 7, from CARG (1992)	63
3.4 Intrinsic relations, photo 6, from Danziger and Gaskins (1993)	64
3.5 Uses of 'in front of' and 'behind' in Tongan	69
3.6 Absolute axes on the island of Vava'u	71
3.7 <i>Ki tahi</i> 'to sea' (from Bennardo, 1996: 127)	72
3.8 <i>Fale Tonga</i> 'Tongan house' (a) and <i>fale papa</i> 'European house' (b)	79
3.9 Church with front-back and left-right assignments	82
3.10 Assignment of <i>mu'a</i> 'front' to a village	84
4.1 Possible responses for 'Animals in a Row' task (adapted from Levinson, 2003: 156)	91
4.2 Possible responses for 'Red and Blue Chips' task (from Levinson, 2003: 160)	92
4.3 Possible solutions for 'Transitivity' task	94
5.1 The digitized village of Houma (from Bennardo and Schultz, 2003: 103)	108
5.2 Power in <i>kava</i> ceremony and <i>fono</i> (from Bennardo, 1996: 278)	112
5.3 Map of church in Houma, Vava'u	114
5.4 Island of Vava'u	118
5.5 Village of Houma, Vava'u	119
5.6 Map of Houma by no. 8 ('Self' strategy)	123

5.7 Map of Houma by no. 7 ('See' strategy)	123
5.8 Map of Houma by no. 3 ('Mu'a' strategy)	124
5.9 Map of the island of Vava'u by no. 11	127
5.10 Map of the island of Vava'u by no. 14	127
5.11 Map of the island of Vava'u by no. 10	128
5.12 Map of the island of Vava'u by no. 15	128
5.13 Map of <i>fono</i> at Hihifo, Niuatoputapu	133
5.14 Memory route for participant 14 in <i>fono</i> at Hihifo	137
5.15 Drawing of <i>fono</i> by participant 14	138
5.16 Map of <i>fono</i> in Houma	143
5.17 <i>Misinale</i> in Houma	148
5.18 Exchanges in the <i>fakaafe</i>	159
6.1 Radiality	174
6.2 Basic meanings of <i>mai</i> and <i>atu</i>	176
6.3 Two meanings for <i>mai</i> and <i>atu</i>	176
6.4 The translation subtype of the relative FoR	177
6.5 A typology of frames of reference (from Bennardo, 2004: 107)	185
7.1 A-possession in Tongan (from Taumoefolau, 1996: 298)	193
7.2 O-possession in Tongan (from Taumoefolau, 1996: 299)	193
7.3 The conceptual content of Tongan possession (from Bennardo, 2000c: 276)	195
8.1 Concepts underlying genealogical space, kin term space and kinship space	214
8.2 Kin term map for male terms	218
8.3 Kin term map from Figure 8.2 with sibling, reciprocals, and descending terms removed	220
8.4 Algebra with sibling and father generating elements	222
8.5 Ascending and descending algebraic structure	224
8.6 Algebraic structure for male elements	226
8.7 Algebra of male elements and algebra of female elements	227
8.8 Structure for 'older sibling' and 'younger sibling' elements	229
8.9 Structure for products of 'son' and 'daughter' elements with 'sibling' elements	231
8.10 <i>Tokoua</i> and male/female and older/younger attributes	232
9.1 Basic meanings of <i>mai</i> and <i>atu</i>	253
9.2 Two meanings for <i>mai</i> and <i>atu</i>	254
9.3 Frequencies of use of <i>mai</i> and <i>atu</i>	258
9.4 Frequencies of use of <i>mai</i> 1 and <i>mai</i> 2	259
9.5 Frequencies of <i>atu</i> 1 and <i>atu</i> 2	260
9.6 Frequencies of use of <i>mai</i> 1 and <i>mai</i> 2 in interviews	262
9.7 Frequencies of <i>atu</i> 1 and <i>atu</i> 2 in interviews	262
9.8 Frequency of types of metaphors	270

9.9	Frequency of type 5 (love) and type 6 (duty/respect) metaphors	271
9.10	Frequency of key words	275
9.11	Frequency of key words in types of texts	276
9.12	Direction (horizontal) of the two types of love	276
9.13	Horizontal direction of love in various types of texts	277
9.14	Horizontal direction of duty/respect in various types of texts	277
9.15	Direction of love (vertical)	278
9.16	Detailed direction of love (vertical)	279
9.17	Types of stories in 2005 interviews	284
10.1	Top part of ranking list	291
10.2	Map of the village	292
10.3	Example of a 'memory route'	293
10.4	Comparing starting point of memory route and residence	294
10.5	Detailed comparison of starting point and residence	294
10.6	Self/Other starting points	295
10.7	Frequency of sorting strategies	298
10.8	Frequency of strategies in first sort	298
10.9	Examples of shapes of drawings	302
10.10	Radial from corner	303
11.1	Structures of <i>kāingas</i>	319
11.2	Example of graph obtained	321
11.3	Ego network of village chief (node no. 89) (from Bennardo and Cappell, in preparation)	327
11.4	Social support relations (SNS1a) among <i>kāingas</i> (from Bennardo and Cappell, in preparation)	328
11.5	Subgraph of SNS1a relations within the village chief's (no. 89) <i>kāinga</i> (from Bennardo and Cappell, in preparation)	329
11.6	Subgraph of SNS1a relations within the village officer's (no. 64) <i>kāinga</i> (from Bennardo and Cappell, in preparation)	330
12.1	Jackendoff's revised architecture of cognition	342
12.2	New proposed architecture of cognition	343
12.3	Culture in mind	345

Tables

2.1 Tongan personal pronouns	page 31
3.1 Lists of nouns found in Churchward (1953)	53
3.2 Spatial nouns in five different structural contexts	55
3.3 Uses of subtypes of relative FoR in small-scale space	67
3.4 Uses of FoRs in small- and large-scale space	77
4.1 Number and gender of informants per task	96
4.2 Results for the three tasks with 60% cut-off point	97
4.3 Results for the three tasks with 70% cut-off point	98
4.4 Absolute versus relative responses on the front–back (sagittal) and left–right (transverse) axes in the ‘Red and Blue’ task	99
4.5 Absolute versus relative responses on the front–back (sagittal) and left–right (transverse) axes in the ‘Transitivity’ task	101
4.6 Absolute versus relative responses on the front–back (sagittal) and left–right (transverse) axes by individual informants in the ‘Red and Blue’ and the ‘Transitivity’ tasks	102
5.1 Gender, place, and orientation of informants for Task 1	120
5.2 Drawing strategies for Task 1	125
5.3 Gender, place, and orientation of informants for Task 2	126
5.4 Drawing strategies for Task 2	129
5.5 Presence of powerful people in memory lists of <i>fono</i> in Hihifo	134
5.6 Memory list about <i>fono</i> from an individual in Hihifo	136
5.7 Grouping of content of memory lists from <i>fono</i> in Hihifo	139
5.8 Frequency of category in subparts of memory lists from <i>fono</i> in Hihifo	140
5.9 Presence of powerful people in memory lists of <i>fono</i> in Houma	142
5.10 Grouping of content of memory lists from <i>fono</i> in Houma	145
5.11 Frequency of category in subparts of memory lists from <i>fono</i> in Houma	146
5.12 Presence of powerful people in memory lists of <i>misinale</i> in Houma	150

5.13 Grouping of content of memory lists from <i>misinale</i> in Houma	151
5.14 Frequency of category in subparts of memory lists from <i>misinale</i> in Houma	153
6.1 The conceptual content of FoRs (from Bennardo, 2004: 105)	181
6.2 Conceptual content for types of absolute FoR (from Bennardo, 2004: 106)	183
7.1 Preposed possessives in Tongan	192
7.2 Derivation of second person forms	192
8.1 Tongan kinship terminology	209
8.2 Tongan kin terms products and kin term structure predicted from products of algebraic symbols	216
8.3 'Older' 'younger' sibling terms	228
9.1 Metaphor frequencies	266
9.2 Metaphors about the king	282
10.1 Starting point of the drawing on the sheet of paper	301
10.2 Format of drawing	304
10.3 First person in the drawing	305
10.4 Clustering strategy/ies in the drawing	306
11.1 List of asymmetric influencers (from Bennardo and Cappell, 2008)	322
11.2 List of villagers with highest global influence measures (outcloseness) (from Bennardo and Cappell, 2008)	323
11.3 Descriptive statistics for level of symmetry (reciprocity of social support)	328
11.4 Outdegree, betweenness, and outcloseness for influence and social support	331
11.5 Indegree for indirect observation (people mentioned)	332
11.6 Correlations of influence, support, and indirect observation indegree with interview, memory, and narrative	334
11.7 Correlations of influence and support outdegree with interview, memory, and narrative	335
11.8 Correlations of influence and support normed betweenness scores with interview, memory, and narrative	336

Preface

This book elucidates the existence of a foundational cultural model in a Polynesian culture, the Kingdom of Tonga. In so doing, a number of central issues in anthropology, cognitive anthropology, linguistics, cognitive psychology, cognitive science, and sociology are discussed in depth. For example, regarding the nature of knowledge representation, a distinction is proposed between mental model and cultural model and how they both differ from schemas (or schemata). Regarding the relationship between language and thought, a dynamic engagement is suggested and a distinctive role for metaphors is envisaged. A clear relationship between cultural models and behavior is asserted as well as a transparent link between various cognitive modules. The role of the spatial relationships module (i.e., space) in the cognitive architecture is presented as fundamental in understanding the internal organization of other modules (or knowledge domains) with which it interacts. Finally, social network analysis is used while investigating the cognitive nature and organization of social relationships.

A mental model consists of bits of knowledge organized in such a way as to facilitate storage and/or retrieval/use of that same knowledge (Craik, 1943; Gentner and Stevens, 1983; Johnson-Laird, 1983). I propose to call “radiality” a specific type of mental model, a Tongan foundational cultural model. The choice is motivated by proposals made by Lakoff (1987), Holland and Quinn (1987) and Shore (1996). Lakoff suggested and elaborated the concept of “image-schema” defined as: a way of thinking about one’s experience in the world derived from “... relatively simple structures that constantly recur in our everyday bodily experience: [...] and in various orientations and relations: *UP-DOWN, FRONT-BACK, PART-WHOLE, CENTER-PERIPHERY* [my italics], etc.” (1987: 267). Holland and Quinn argue that a “thematic effect arises from the availability of a small number of *very general-purpose cultural models* [my italics] that are repeatedly incorporated into other cultural models ...” (1987: 11). And Shore states: “*Foundational* [my italics] schemas organize or link up a ‘family’ of related models” (1996: 53).

I define radiality as a ‘mental’ model, because in Johnson-Laird’s (1999) words “A crucial feature [of mental models] is that their structure corresponds

to the structure of what they represent” (p. 525). The investigation of mental models, then, is enhanced by a thorough understanding of the context (physical and human) in which they are acquired and realized. I call it a ‘cultural model’ because in D’Andrade’s (1989) words it is “a cognitive schema that is intersubjectively shared by a social group” (p. 809). Finally, I choose to term it ‘foundational’ because it is shared by a number of knowledge domains in various cognitive modules (Shore, 1996). In other words, radially is conceived as a fundamental cognitive process that is used to organize knowledge across mental modules. Its intrinsic nature is spatial and as such it belongs to the spatial representations module (see Jackendoff, 1997). Tongans, though, preferably adopt/use radially in other domains of knowledge – exchanges, religion, kinship, social networks, political action, and social relationships – in other modules, including the action module and the conceptual structure module. The existence of radially does not exclude the presence of other foundational cultural models.

The decision to posit radially as a foundational model and to investigate the domain of social relationships was also influenced by two other bodies of literature: one about a number of proposals suggesting radially in many aspects of Eastern (e.g., Nisbett, 2003), South-East Asian (e.g., Kuipers, 1998), Micronesian (e.g., Ross, 1973), and other Polynesian societies (e.g., Shore, 1996; Herdrich and Lehman, 2002); and one containing current ideas about the content of a ‘cultural’ component-module of the mind (e.g., Jackendoff, 1992, 1997, 2007; Pinker, 1997; Talmy, 2000a, 2000b) that is orchestrated around the mental representations of social relationships (i.e., kinship, group membership, dominance).

When representing spatial relationships in small-scale space in long-term memory, Tongans prefer the absolute frame of reference. The specific subtype of the absolute frame of reference that they use is one that I have called “radial” (Bennardo, 1996, 2002a). *A fixed point of reference in the field of the speaker is selected and objects are represented as from or toward that point.* It is this non-ego-based (other-based) mental organization of knowledge in the spatial relationships module (radially) that is found repeated in the preferential organization of other knowledge domains in other mental modules and as such it is proposed as a foundational cultural model.

The notion of foundational cultural model I adopt needs some clarification. In cognitive psychology, Brewer defines schemata (preferred plural of schema for psychologists) as “the psychological constructs that are postulated to account for the molar forms of human generic knowledge” (1999: 729). He traces the origin of the concept back to Kant, Bartlett, Piaget, and more recently to Minsky (1975), who called these “molar” constructions frames. A subtype of schema for sequences of actions is called script by Abelson and Schank (1977).

Schemas (preferred plural of schema for anthropologists, but see Casson, 1983; Keller, 1992) are proposed as abstract mental entities whose content does not need to be completely filled before the whole structure is activated/retrieved. Thus, in talking about an ‘eating at a restaurant’ event, people do not need to relate all the parts of the ‘eating at a restaurant’ schema and at the same time expect the same/similar schema to become activated in its entirety in the other person’s mind. It is this type of “cognitive schema” that D’Andrade is advocating as “shared” in his definition of cultural model given above.

I propose as a foundational cultural model a schema (or mental model) that, besides being shared by a group of individuals, is primarily shared by a number of cognitive modules and by a number of knowledge domains in each individual. Basically, I am proposing to call a foundational cultural model a homology in the organization of knowledge across mental modules and in various knowledge domains. This organization (or structure) is a set of relationships between units of knowledge that results from the generative capacity of higher-level mental processes – they derive from them. The structure itself also exhibits generative capacities and is capable of realizing a variety of instantiations – it generates a number of cultural models.

This proposal is indebted to the “image-schema” concept suggested and elaborated by Lakoff (1987) in cognitive semantics and more recently by Mandler (2004) in developmental psychology. In cognitive anthropology, I was also influenced in my thinking by the “foundational schema” concept introduced by Shore (1996). Both suggestions, though, fell short in satisfying what I needed to explain my data. Thus, the genesis of the ideas briefly introduced in the above paragraph.

The proposal is new in three ways. First, it forces one to look for similar organizations of knowledge across mental modules and knowledge domains within an individual mind, and across individuals, i.e., members of a social group/community. Second, it looks at these mental structures as a stage in the cognitive understanding and construction of meaning and behavior. Reasoning, inferences, deductions, beliefs, and behavior (including linguistic behavior) undergo this generative process and are affected/molded at this stage. Third, it dovetails with research conducted on individualism versus collectivism (Triandis, 1995; Kusserow, 2004; Greenfield, 2005). Radiality, in fact, is seen as the generative mental engine behind various forms of collectivism.

Supported by two NSF grants (no. 0349011 and no. 0650458), during my search for evidence of the hypothesized cultural model, I collected and analyzed a variety of data – ethnographic, linguistic, experimental, behavioral, social networks, and geographic (e.g., GIS and 3-D renderings) – and used a number of methodologies – participant observation, interviews, semantic analyses, analyses/parsing of texts, administration of experimental tasks (e.g., memory tasks, drawing tasks, sorting tasks, kinship tasks), administration of

questionnaires, indirect observation of social networks, social network analysis – in a cross-disciplinary fashion. The motivation for such an array of data and methods is to be attributed to the cross-domain (knowledge) and cross-modular (cognition) investigation conducted.

For example, linguistic data were gathered to conduct semantic analyses of the spatial relationships domain, e.g., spatial prepositions, spatial nouns, and directionals. Some of these same data and others were also analyzed to achieve an understanding of specific linguistic practices, i.e., instances of language use. Usage patterns and preferences emerged that enhanced the supporting evidence available for the main hypothesis. Moreover, some data was analyzed in a multi-dimensional fashion. For example, some linguistic data such as interviews about social relationships (i.e., telling a story) were analyzed for linguistic reasons (e.g., frequency of use of some lexemes), for social network purposes, (e.g., influence structure of the village), and for cognitive objectives (e.g., dimensions of the group – number and type of individuals – recalled and mentioned as an indication of specific forms of mental representation of those same groups).

The following statement summarizes the major findings obtained: radial organization is pervasive in the Tongan domains of knowledge and mental modules investigated. The findings, besides supporting the hypothesis, have relevance for the way in which the human cognitive architecture can be conceptualized. Specifically, a number of domains of knowledge are shown to share a similar fundamental organization, a foundational cultural model, thus indicating a specific way in which cross-modular interactions may take place. The role of cultural models in cognition is clearly established, but many questions about the specifics of their significance still remain.

Acknowledgments

This book is the result of one and a half decades of research during which I was mentored, supported, or simply helped by a number of people, institutions, and agencies. I am deeply indebted to all of them and I am acknowledging their contribution below in some kind of chronological order. For all of those I am leaving out, I do apologize in advance and ask for their forgiveness.

Kris Lehman and Janet Keller at University of Illinois, Urbana-Champaign, Department of Anthropology, took the renegade linguist I was and made me into the linguistic and cognitive anthropologist I think I currently am. Steve Levinson, Gunter Senft, and all the other colleagues at the Max Planck Institute for Psycholinguistics, Cognitive Anthropology Research Group, Nijmegen, The Netherlands, taught me lessons about the essential value of empirical data collection. William Brewer, Department of Psychology, Jerry Morgan, Department of Linguistics, and Norman Whitten, Department of Anthropology, all at University of Illinois, Urbana-Champaign, helped me in sharpening my thinking during the first stages of the research project presented in this book.

Three parts of my research were conducted in strict collaboration with colleagues and students: the “Digitized Tonga” database, the social network analysis, and the algebraic analysis of the Tongan kinship terminology. For the “Digitized Tonga” database I want to thank the remarkable skills and patience of Kelly Hattman, a graduate assistant, of Jennifer Testa, Caroline Pempek, Naimah Ali, Suzanne Alton, Dana Cali, and Paul Herrick, all Undergraduate Research Assistantship Program (URAP) students in the Department of Anthropology at Northern Illinois University. Paul Herrick was also extremely helpful for some data analysis and data conversion (from analog to digital). Kurt Schultz, Northern Illinois University, School of Art, was essential in the conceptualization and implementation of the “Synchronized Media and Visualization Analysis Tool” (SMVAT), the 3-D part of the “Digitized Tonga” database.

Regarding social network analysis, Charles Cappell, Northern Illinois University, Department of Sociology, was the researcher and collaborator that made it possible. His contribution to the research is explicitly acknowledged in Chapter 11, but the insights into the data that he provided go well beyond

the content of that chapter. I am also indebted to Jeff Wagley, Nathan Walters, and Tony Robertson, all three URAP students at Northern Illinois University, who painstakingly helped in converting raw data into sociomatrices to be later processed and analyzed.

The algebraic analysis of the Tongan kinship terminology was conducted in strict collaboration with Dwight Read, UCLA, Department of Anthropology. The project was first conceived when we met at UCLA in 1998, and it took several years to complete. I must thank Dwight for patiently working with me over these years and slowly mentoring me into the arcane world of algebraic kinship analysis. It took me a while, but I came out of this experience as a better researcher than I could ever have become all by myself. I also need to thank Sachiko Koike, a URAP student at Northern Illinois University, for processing some raw data about the kinship project.

I want to thank Nicole Simon, another URAP student at Northern Illinois University, for patiently scanning and digitizing a number of Tongan texts and readying them for analysis. It was not an easy task to work with an unfamiliar language like Tongan, but she managed perfectly. My two Tongan graduate assistants, Lisita Taufa and Siniva Samani, deserve a special mention. The linguistic analysis conducted on the Tongan data about social relationships were all conducted with their close collaboration. I want to point out especially the three year contribution provided by Lisita, who worked with me patiently and effectively, both in Tonga and in the US, while we were both discovering and learning more every day about the Tongan ways of speaking and thinking.

Most of the material presented in this book was either discussed with colleagues and with students, or presented at conferences, or published in various forms. I want to express my gratitude and appreciation to editors of journals, anonymous reviewers, participants at professional meetings, colleagues in my department and other departments at NIU, and at departments in other institutions, and students in the classes I taught at UCLA, University of Missouri, College of Charleston, and Northern Illinois University. During the production of the book, the efficient and professional contributions of Helen Barton and other staff at Cambridge University Press were invaluable. This book would not have been completed without the contributions of all these individuals. Thanks also to the various presses that gave permission to reprint material.

A number of institutions supported my research. First and foremost, the National Science Foundation honored me with two grants (BCS 0349011 and BCS 0650458) that provided fundamental support from 2004 through 2008. At the onset of the project, the University of Illinois at Urbana-Champaign, both the Department of Anthropology and the Graduate College, sponsored my initial efforts. Then, it was the Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands that provided the financial environment within which the first part of my research could be completed. Later, I received some

support from the College of Charleston, both a Dean of School of Humanities and Social Sciences research grant and a Faculty Research Grant. Finally, a number of Faculty Research and Artistry Grants (2001, 2002, 2005, 2007) and two Travel Grants (2005, 2006) from the Graduate School at Northern Illinois University contributed to the continuation of the research and its final completion.

I want to thank the Government of Tonga for granting me permission to conduct the research in the Kingdom. My fieldwork experience in Tonga has not only provided the data to fill the pages of this book but mainly enriched my soul with exciting and profound human experiences. The person I must thank first is Loisi Finau, my Tongan teacher in Tonga. She introduced me to the Tongan language, but most of all to the Tongan heart. In fact, after only a few weeks of working together she asked her family in her native village, Houma, Vava'u, to host me at their house for as long as I wished. Houma eventually became my main field site and the Finau family my adoptive Tongan family.

Regarding people in Houma, I must especially thank Sione Finau and the late Mele Finau for accepting me into their family. Besides, I want to thank in particular Nunia Finau, who worked patiently with me for months as my assistant, informant, and collaborator. Her graceful explanations, her soft attitude, and her warm friendship are one of the most valuable gifts I received during my whole stay in Tonga. Thanks go to Taniela Lolohea for supervising the data collection by my collaborators in Houma in 2004, 2005, and 2007, and for spending wonderfully enlightening hours with me while we transcribed interviews. All the people of Houma deserve a special thanks because they donated to me their understanding, their patience, and above all their friendship and respect. I want to make sure that they understand that I have carved a special place for them in my heart.

I want also to thank Siaki Tokolahi, one of my collaborators, who accompanied me on my trip to Niatoputapu, and Semisi Tokolahi in whose house I lived during my stay in the village of Hihifo, Niatoputapu. The people of Hihifo deserve a special thanks for their joyous readiness to cooperate and comply with my requests of performing tasks, to answer my thousands of questions, and to satisfy my endless professional and personal curiosity. I devote a special thankful thought to Leo Hoponoa and his family. He was my Tongan teacher in the United States and a student colleague, but most of all by living in my house for a year we became close friends. He was my collaborator in the field and helped me greatly during my stay in Ngele'ia, Tongatapu, his native village. His family hosted me several times while visiting Nuku'alofa on my way to Houma, Vava'u or back to the United States. Above all, Leo and his family contributed greatly in making Tonga become for me a familiar, warm, and friendly place.

While in Tonga, I came into contact with several people who befriended me, helped me, talked to me, and made me feel at home in their country. I want to give my most sincere thanks to all the Tongan people not mentioned, but whose company and help I have enjoyed. Without them this book would not have been possible. I hope I am faithful to the message they have entitled me to carry outside of their wonderful world.

The writing of this book was accomplished with the essential contribution of the continuous, warm, and supporting advice of Katharine Wiegele, my wife. She listened to me when I needed to talk about my work. She pushed me along when my mental energy faulted me. She praised me when I completed a task. She took care of the millions of things I was dropping aside while intensely concentrating on my writing. She was and is my wonderful companion, she completes my life, professionally, personally, and spiritually. No words are sufficient to express what I feel, and I am forced to make a “thank you from the bottom of my heart” suffice to provide a minimal pointer towards my feelings. Maya, Lucio, and Matteo are my children and they deserve to be mentioned because they too contributed to the process. They missed me when I was not around and they wanted me, they had to bear the burden of my swinging moody days, they adjusted to a somewhat absentminded father who was not really paying attention to violin or clothing issues, Harry Potter stories, or Power Rangers adventures. They especially missed me during my fieldwork months in Tonga, and I hope that marveling their friends with their father’s travels and adventures in the South Sea make up for that, even if just a little.

Finally, I take full responsibility for any mistakes, misrepresentations or fallacies that may be contained in the present book.

Abbreviations

adj	adjective
art	article
clas	classifier
conj	conjunct
dem	demonstrative
dir	direction
expr	existential preposition
interj	interjection
iposs	indefinite
N	noun
neg	negation
num	numeral
part	particle: untranslatable before numerals
poss	possessive adjective
pospr	possessive preposition
pp	personal pronoun
pr	preposition introducing subject or object
prpr	presentational preposition
sN	spatial noun
sP	spatial preposition
tns	tense
V	verb

1 A foundational cultural model in Tongan language, culture, and social relationships

1.1 Introduction

I have just finished interviewing and videotaping a minister of the Government of the Kingdom of Tonga. My Tongan assistant is slowly collecting the videotaping equipment and I am taking my leave from the minister formally thanking him for his time and patience with my non-native Tongan. When walking outside the ministry building, I ask my assistant if she had noticed an episode that took place while I was interviewing. There was a knock at the door and the minister, after interrupting his speech, allowed the person to come in. It was his secretary. She opened the door, bowed and kneeled profoundly, and then asked permission to deliver a written message. The minister told her to approach and deliver the message. She did so by keeping her kneeling position and finally exited the room still almost on her knees and continuing to bow, never turning her back to the minister.

I tell my assistant that I was a little surprised by this behavior, also because the minister is not a noble. My assistant replies that ministers are due the same respect as nobles are. First, she adds, it is only a very recent innovation that ministers are not nobles, and secondly, ministers are high dignitaries of the land and are entitled to receive the appropriate respectful behavior. Besides, she did not find the secretary's behavior odd at all. In fact, she had often used that same behavior at school with some of her teachers. Then, she goes on to tell me this story.

One day a teacher called her up to the desk. She approached the desk bowing and almost kneeling (in the same way the secretary had done). Then the teacher proceeded to pull her hair and at the same time scold her for something she had done. She adds that she felt no *mā* 'shame' because she did not have a boyfriend or a relative in the class. She continues by saying that she would have felt really *mā* had she had one of those relations witnessing the event. She also explains that she would feel *mā* because she would have brought *mā* to them by her behavior.

This episode took place during my last visit to Tonga in summer 2007. I decided to start this book by telling this story because it is illustrative of a fundamental way of thinking in Tongan. What happens to an individual's ego is not the focus of that same individual's attention. One focuses on an other-than-ego

individual (or more than one individual, or a group) and the consequences of one's behavior on that other-than-ego person/s. In other words, a point, i.e., a place, a person, or event, is chosen in the field of ego, i.e., the spatial field, the social field, or the event field, and other points are put in relationship to the previously chosen one, either centripetally, i.e., toward it, or centrifugally, i.e., away from it.

The episode specifically illustrates the presence of such a mental construction in the domain of social relationships or social cognition. The nature of the mental construction, however, is inherently spatial and it is in the domain of spatial relationships that I first encountered such a Tongan preference. Besides, I found it repeated in other domains of knowledge, such as time, possession, exchanges, traditional religion, and navigation. I labeled this preferred mental organization of knowledge a foundational cultural model and named it 'radi-ality.' The discovery of such a mental organization of knowledge led me to reflect on the nature of cultural models and hypothesize a fundamental role they play in the overall architecture of human cognition.

1.2 Why Tonga?

The Kingdom of Tonga is a Polynesian country composed of 170 small islands, divided into three major archipelagoes and lying in a south-north direction in the South Pacific. The population, around 100,000, speaks Tongan, an Austronesian, and specifically Oceanic, Western Polynesian, Tongic language (see [Chapter 2](#)). Both cultural and linguistic reasons brought me to this tiny corner of the world to investigate characteristics of the human mind.

Tongan sociocultural organization is unique. It is a millennium-old monarchy in which the majority of the population typically resides in small villages. A recent growth of a democratic movement makes its political landscape effervescent to say the least. In November 2006, political riots broke out in Tonga's capital city, leaving widespread damage from fire and looting, and eight dead. While the debate between loyalists to the monarchy and the recently established democratic movement has deteriorated, the legitimacy of the monarchic system has largely gone unchallenged (Hoponoo, 1992; James, 1994). Among both commoners and the nation's elite, Tongans feel that their cultural history is congruent with their monarchy. The hierarchical structure is so pervasive in the society that it provides a salient variable against which other sociocultural parameters may be highlighted and measured.

There are several reasons underpinning my choice of the Tongan language as the ground for testing my theoretical approach and for comparing the results obtained by my conceptual analyses of English spatial prepositions (Lehman and Bennardo, 2003). First of all and more generally, English and Tongan belong to two different major language families, namely, Indo-European and

Austronesian, providing a minimal test of universalistic hypotheses. Second, Tongan has only three spatial prepositions, thus it provides a good comparative challenge to analyses done on a language such as English where the number of spatial prepositions is much higher (around eighty, see Jackendoff, 1992b: 107–8). Besides, since the linguistic representation of spatial relationships in Tongan is realized by different lexemes from those in English, it is relevant to find out what conceptual content the former encode.

Third, Tongan as the language of the first people to be called Polynesians shows innovations which came to characterize the Polynesian language family. This is particularly apparent in the system of directionals it currently uses. A triadic system is in place compared to a very widespread dual one (centripetal–centrifugal movement) in Melanesia (Ozanne-Rivierre, 1997), the motherland whence Polynesians sailed away more than three thousand years ago. This directional system turns out to be rooted in the foundational cultural model this book elucidates (Bennardo, 1999).

These cultural-linguistic characteristics, among others, turned my attention to Tonga. My first investigation focused on the linguistic and cognitive representations of spatial relationships. The results were very intriguing. Linguistic and cognitive preferences for the representations of spatial relationships highlighted a deep-rooted preference for a radial system of representing space. That is, a point, i.e., a place, is chosen in the field of ego, i.e., the spatial field, and other points are put in relationship to the previously chosen one either centripetally, i.e., toward it, or centrifugally, i.e., away from it.

Later, I discovered the presence of this radial system in other domains of Tongan knowledge and consequently, I continued to stay focused on Tonga. I realized that since the fundamentally spatial radial system finds its way into those other domains I could be in the presence of a foundational mental model. Moreover, this model is extensively shared within the Tongan cultural milieu and it can be labeled a foundational ‘cultural’ model, an essential part of what it means to be Tongan. The presence of such a preferred model has consequences in the way an individual may think and behave. Besides, the finding of such a mental organization of knowledge also has concrete implications for the way one conceives of the architecture of human cognition.

I studied Tongan language and culture for fifteen years and spent more than two years of residence in the kingdom. I collected extensive ethnographic, linguistic, and cognitive data. Most of these data found their way into this book, but much more remain at the margins, and more yet never appear. Nonetheless, all of the data and experiences gathered contribute in their own peculiar way to the emergence of the principal hypothesis for this book and to its partial resolution. It was a long journey, and the content of this book represents a stage at which the traveler regrouped and stopped to reflect on the value of the achievements obtained.

1.3 The architecture of the mind and its internal working structure

There are two hypotheses about the architecture and nature of cognition that represent the foundations of my own position. The first hypothesis is Jackendoff's (1983, 1992b, 1997, 2002, 2007) "Representational Modularity;"¹ the second hypothesis is the one advanced by Janet D. Dougherty (later J. D. Keller) with Charles M. Keller, and separately, with F. K. Lehman. They call their approach to cognition "radically intensional" (J. D. Keller and Lehman, 1991: 272, note 1).

Jackendoff defines his approach like this:

Representational Modularity is by no means a "virtual necessity." It is a hypothesis about the overall architecture of the mind, to be verified in terms of not only the language faculty but other faculties as well. I therefore do not wish to claim for it any degree of inevitability. Nonetheless, it appears to be a plausible way of looking at how the mind is put together, with preliminary support from many different quarters. (Jackendoff, 1997: 45)

In his attempt to widen the Chomskyan research project, Jackendoff devotes extensive attention to the investigation of the semantic component of language. He reaches the conclusion that "*semantic structure* and *conceptual structure* denote the same level of representation" (Jackendoff, 1983: 95 [original italics]) and he calls this latter "conceptual structures." Furthermore, this single level of conceptual structures is the "level of mental representation onto which and from which all peripheral information is mapped" (Jackendoff, 1983: 19). In later works (1992b, 1997, 2002) he refines his proposal and suggests the overall architecture presented in Figure 1.1.

Conceptual structures remain central in this new architecture. They are propositional in nature and their modeling resembles linguistic/syntactic structures (see Jackendoff, 1983, 1990, 2002). However, three major innovations are now introduced: correspondence rules (represented by bold double-headed arrows) or "interface modules" between modules, the "spatial representation" module,² and the "auditory information" module which also inputs conceptual structures. An interface module provides a link between major modules by being structurally compatible with the two modules it unites. This is accomplished by a structural core of the interface module made up of correspondence rules (not directly in contact with either modules to be linked), and two peripheral structures each compatible with the structures of one of the two modules linked

¹ Foundational to this proposal, but not homologous, are Chomsky's (1972) and Fodor's (1983) modularity suggestions (but see others in Hirschfeld and Gelman, 1994).

² Jackendoff had already introduced a module called "3D model structures" in 1992b: 14, but it was at that time only related to the "visual faculty" model.

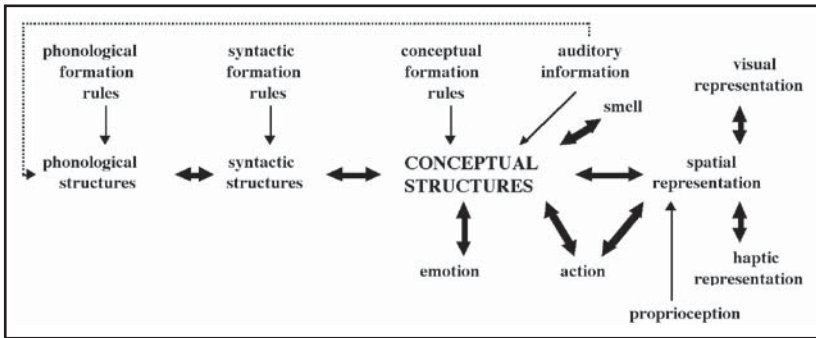


Figure 1.1 Jackendoff's architecture of cognition (from Jackendoff, 1997: 39 and 44)

(Jackendoff, 1997: 21ff; see also 2002). The advantage of this proposal is that it allows for major modules to be substantially different in their structures, while information can still move between them.

The findings of the vast literature available on the visual system convince Jackendoff to posit the module he calls “spatial representation” as separate from the central module of conceptual structures (see also Jackendoff and Landau, 1992; Landau and Jackendoff, 1993). He says, “[C]ertain types of visual/spatial information (such as details of shape) cannot be represented propositionally/linguistically. Consequently visual/spatial representation must be encoded in one or more modules distinct from conceptual structures” (Jackendoff, 1997: 43). Furthermore, this module is also the center of reference for other modules connected exclusively and directly with conceptual structures in his previous proposals. These modules are “action,” “haptic representation,” and “proprioception.” Finally, auditory information previously inputting only phonological structures is now also inputting conceptual structures. Thus, the architecture proposed has increased in complexity as a function of the increasing amount of new information about module interactions.

It is impossible in this work to summarize all the detailed linguistic analyses and literature Jackendoff brings forth in support of his proposal. One relevant feature of his architecture of the mind is that it is driven by the two largest bodies of knowledge recently accumulated about the functioning of the mind: knowledge of the linguistic system and knowledge of the visual system. In Jackendoff (1992a, 2007), a third type of knowledge, cultural knowledge, was added.³ This led him to hypothesize another module of the mind, a social cognition module (Figure 1.2).

³ In Jackendoff (1992a) issues related to society and culture in the mind had already been introduced.

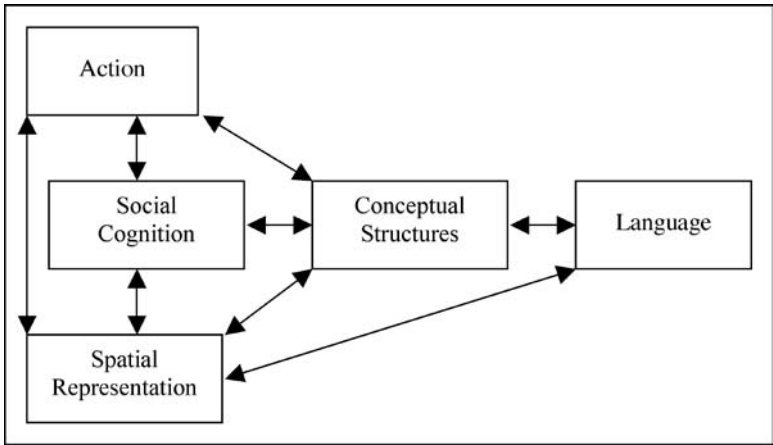


Figure 1.2 Jackendoff’s revised architecture of cognition

On a very similar line of thinking, Levinson (2006) proposes that “the roots of human sociality lie in a special capacity for social interaction, which itself holds key to human evolution, the evolution of language, the nature of much of our daily concerns, the building blocks of social systems, and even the limitations of our political systems” (p. 39). He calls this system, the “interaction engine.” I will restrict myself to Jackendoff’s terminology for now.⁴

One problematic point in Jackendoff’s overall proposal remains the collapsing of linguistic semantics with conceptual structures. Lehman and Bennardo (2003) demonstrate why this is not appropriate.⁵ They argue for a conceptual content of English spatial prepositions that dictates the interpretation of their arguments as either Locus⁶ or Place. An Object⁷ is conceptually a Place when its geometrical characteristics count, and it is a Locus when it can be reduced to a Point because its geometric characteristics do not count. It is only when an Object (e.g., a noun like ‘building’) is an argument of a spatial preposition (e.g., ‘to,’ ‘from,’ ‘between’) that it will be considered either a Locus or a Place according to the specific preposition. The noun then acquires a specific

⁴ Talmy (2000b) states: “Our general perspective is that there has evolved in the human species an innately determined system whose principal function is the acquisition, exercise, and imparting of culture” (p. 373). He calls this “system” the “Cognitive Culture System.” In other words, Talmy too suggests that a part of our human mind is specialized for culture whose main component is the definition of the interaction between self and others or groups (pp. 378–400).

⁵ See also J. D. Keller and Lehman, 1991: 281, notes 9 and 10, for a similar position.

⁶ From now on a capital letter indicates a concept.

⁷ The concept Object is very abstract and can be a physical object, a place, or an abstract idea (Lehman and Bennardo, 2003).

linguistic meaning that is different from its dual potential conceptual meaning (either a Locus or a Place). Similarly, Broschart (1997b) demonstrates that some Tongan lexical items are neither verbs nor nouns until they appear in a specific structural construction. That is, they acquire linguistic meaning in addition to their conceptual meaning. Thus, I will keep for now the distinction between linguistic meaning (i.e., semantics) and conceptual meaning (i.e., conceptual structures).⁸

The second hypothesis about the architecture and the nature of cognition I consider is the result of a collaboration of Janet D. Dougherty (later J. D. Keller) with Charles M. Keller, and separately, with F. K. Lehman (Dougherty and C. M. Keller, 1985; Lehman, 1985; J. D. Keller and Lehman, 1991, 1993; J. D. Keller and C. M. Keller, 1993, 1996a, 1996b). Dougherty and C. M. Keller demonstrate that it is impossible to access cognition fully by using only linguistic data. Their focus on “conceptualization” leads them to “characterize knowledge structures as constellations of conceptual units arising in response to a task at hand” (Dougherty and C. M. Keller, 1985: 165). These “constellations are ephemeral” (1985: 166), they are constructed only to tackle a “task” and do not bind the participating conceptual units beyond the duration of the task. When used repeatedly over a period of time they become “recipes,” that is, habitual cognitive responses to tasks (J. D. Keller and C. M. Keller, 1996b: 91). The activated conceptual units include technical imagery, goals, and linguistic labels – that is, naming. None of these activated units, however, are independently sufficient to retrieve the conceptual constellation.

The two authors offer an anti-Whorfian argument by arguing that “the named class to which an object belongs for purposes of standard reference in general classification schemes has little influence over its occurrences in other constellations of applied knowledge” (Dougherty and C. M. Keller, 1985: 171). In other words, since cognition/thought works in task-oriented constellations that include a variety of conceptual units, it cannot be argued that language determines thought/cognition (although linguistic labels of objects are present).

This hypothesis about knowledge/cognition in action is very important, but leaves unaddressed the issue of the nature of knowledge, and unanswered the question of how it is possible for these “constellations” of units of knowledge to come together and constitute a well-connected unit eventually used in action. In other words, once it is demonstrated that knowledge is activated in bundles, the question arises about how this is possible. What is the nature of knowledge structures such that units of knowledge (i.e., concepts) can ‘bundle’ together?

⁸ Recently, Jackendoff (2007) came very close to a similar position when he states “linguistics semantics per se is the study of the interface between conceptualization and linguistic form (phonology and syntax). It therefore studies the organization of conceptualization that can be expressed or invoked by language” (p. 293).

Is there a common underlying structure/nature for knowledge from different sources (e.g., perceptual, visual, emotive, etc.)?

These questions are addressed in Lehman (1985) and J. D. Keller and Lehman (1991). They state that their approach to cognition is “radically intensional” (J. D. Keller and Lehman, 1991: 272, note 1). In linguistic semantics, to adopt an ‘intensional’ approach means to consider meaning as the defining properties of terms (intension) and not as the set of objects in the world to which terms are applied (extension; see Frege, 1975). Consequently, Keller and Lehman look at cognition to discover its properties as mental/conceptual phenomena per se and not as defined by the external world phenomena to which they are related. They consider knowledge domains as theories, and concepts – units of knowledge – as generated within these theories (for similar positions see Murphy and Medin, 1985; Medin, 1989; Gelman, Coley, and Gottfried, 1994; but also Johnson-Laird, 1983; and Jackendoff, 1997).

They define the internal computations of these theories not as a number “of binary features in a matrix whose dimensions are nothing but such features” (1991: 288), but as a number of relations – including cause-and-effect – that are possible given the axioms of the theory. In other words, theories are computational devices; that is, given a set of axioms, a number of theorems can be obtained (generated concepts can be considered theorems). Theories are also recursive computational devices. Once theorems have been obtained, they may function as axioms for other theories. Considering knowledge domains as theories and concepts as theorems (and due to recursiveness also mini-theories) explains how they can come together to become “constellations” of knowledge. This is possible only because they share this basic intra- and inter-structure or nature.

1.4 A blended approach to cognition

I am convinced that both of these approaches to cognition and to the architecture of the mind are viable and can be combined. Then, I adopt a computational approach to cognition within a general “Representational Modularity” architecture of mind (Bennardo, 2003). My intensional analyses of both English spatial prepositions and the three Tongan spatial prepositions, five Tongan directionals (post-verbal adverbs expressing direction of movement), and Tongan spatial nouns yielded a number of axioms for a partial theory of space, that is, for a substantial part of the content of Jackendoff’s spatial representation module (see Lehman and Bennardo, 2003; Bennardo, 1993, 1996, 1999, 2000b).

The major axioms of this partial theory include concepts such as Locus, Object, Vector, Path, Verticality, and Horizontality (for definitions see Chapter 6, Section 6.2.2.1). These axiomatic concepts of the partial theory of space are

used to construct frames of reference (for a similar approach see Levinson, 1996a, 2003) that are part of the content of the spatial representation module (Jackendoff, 1997, 2002). In other words, frames of reference are considered theorems derived from the major axiomatic content of the partial theory of space.

For example, given the following axioms: a Locus (the speaker), a Vector – a complex concept made up of a Locus (beginning point, in this case the speaker), a Body (repeated points), and Direction – the concept of Verticality, and the concept of Horizontality, a relative frame of reference can be generated by using also the Repeat Function – to repeat the construction of vectors and obtain axes.⁹ I describe a relative frame of reference as a set of coordinates – three axes: vertical, sagittal, and transversal – that create an oriented space centered on a speaker (see Chapter 3, Section 3.3.2). Once generated as theorems of the partial axiomatic content of the spatial representation module, frames of reference can function as axioms of a partial theory of space that can be used to generate specific spatial descriptions as expressed in linguistic strings (see Miller and Johnson-Laird, 1976; Levelt, 1982, 1984; Levinson, 1996b) or other behavior (see Ellen and Thinus-Blanc, 1987; for animal behavior see Gallistel, 1993).

The approach to cognition I adopt – its architecture and its computation – allows me to shed light on why my findings about the specific way of organizing spatial relationship in Tonga could be replicated in other domains of knowledge. The common generative computational nature of the content of cognition/knowledge, combined with the inevitable exchange pathway between the spatial representation and other cognitive modules, including the conceptual structures and social cognition modules, are the two explanatory landmarks. Since knowledge is structured in the same way, it can travel across modules. Since spatial representation knowledge interacts with conceptual structures, action, social cognition, and other modules, it can be replicated in other domains of knowledge.

The role that knowledge about space and the preferential way it is organized play in human cognition are of paramount importance. The vast amount of research and the numerous publications about spatial cognition clearly support this statement. I only mention here three works. First, that of Lakoff (1987) on conceptual organization in which he clearly delineates a conceptual theory in which spatial image-schemas are fundamental. Second, that of Mandler (2004) on child development in which she suggests that spatial image-schemas are pre-linguistically used and foundational to human conceptual development. Finally, Levinson (2003) poignantly shows how cross-cultural and cross-linguistic investigations of space yield findings that can illuminate our still limited understanding of the human mind.

⁹ Please note that this process has been highly simplified for brevity and clarity of presentation.

In this book, I show how the preferred way in which Tongans organize spatial representation is reiterated in other mental modules, specifically, the conceptual structures module (several knowledge domains, e.g., possession, temporal relationships, traditional navigation, traditional religious beliefs), the action module (e.g., *fono* ‘village meeting,’ rituals, exchange patterns), and the social cognition module (e.g., kinship, social relationships). Thus, I argue that understanding any preference in the spatial representation module provides a unique and relevant entry into the preferred organization of other mental modules.

1.5 Cultural models

A sentence is the fundamental unit of analysis for language in mind (Chomsky, 1957, 1972, 1986, 1995; Pinker, 1994, 1997, 1999; Jackendoff, 1992, 1997, 2002; Levelt, 1989). What is the fundamental unit of analysis for culture in mind? I suggest a cultural model, specifically, a foundational cultural model. Before clarifying my position, I need to explain what I mean by culture in mind.

In 1911, Boas wrote:

Thus it appears that from practical, as well as from theoretical, points of view, the study of language must be considered as one of the most important branches of ethnological studies, because, on the one hand, a thorough insight into ethnology can not be gained without practical knowledge of language, and, on the other hand, the fundamental concepts illustrated by human languages are not distinct in kind from ethnological phenomena; and because, furthermore, the peculiar characteristics of languages are clearly reflected in the views and customs of the peoples of the world. (p. 69)

In other words, since both language and culture are mental phenomena, understanding one (language) is conducive to understanding the other (culture). Similarly, in 1952, Levi-Strauss wrote:

I would say that between culture and language there cannot be no relations at all, and there cannot be 100 per cent correlation either.

...

So the conclusion [that] seems to me the most likely is that some kind of correlation exists between certain things on certain levels, and our main task is to determine what these things are and what these levels are. This can be done only through a close cooperation between linguists and anthropologists. (p. 79)

It is well known that it was the illustration of the working of the mind underlying both culture and language that defined Levi-Strauss’s life-long research enterprise (Leach, 1974). It was only with Goodenough (1957) that the locus of culture was clearly and programmatically located in the individual mind. His frequently quoted statement asserts that culture is “whatever it is one has to know or believe in order to operate in a manner acceptable to its members” (p. 36). However, since individuals all have a human mind, when they grow in

the same place and have similar experiences, the content (i.e., knowledge) of their minds comes to be similar. This may have led and leads anthropologists to think of culture as external to the individual.

In summary, language and culture are related because they are both mental phenomena. Culture is located in the mind of individuals as organized knowledge that generates behavior. Thus, if we understand the content of the mind, both its working (i.e., computation) and its structure (i.e., architecture), we can possibly understand culture better (for a similar position see Strauss and Quinn, 1997). I have already outlined in the [previous section](#) my views regarding both mental computation and architecture. I am well positioned now to suggest a cultural model as a unit of analysis for culture in mind.

What is a cultural model? First and fundamentally, a cultural model is a mental model. A mental model consists of bits of knowledge organized in such a way as to facilitate storage and/or retrieval/use of that same knowledge (Craik, 1943; Gentner and Stevens, 1983; Johnson-Laird, 1983). A comparatively similar mental organization of knowledge is also called frame, or script, or schema (Bateson, 1972; Minsky, 1975; Abelson and Schank, 1977; Fillmore, 1982; Rumelhart, 1980; Brewer, 1984, 1987, 1999; Brewer and Nakamura, 1984; Keller, 1992). In Johnson-Laird's (1999) words, "A crucial feature [of mental models] is that their structure corresponds to the structure of what they represent" (p. 525). The investigation of mental models, then, is enhanced by a thorough understanding of the context (physical and human, i.e., cultural) in which they are acquired and realized.

Second, a mental model becomes a cultural model when it "is intersubjectively shared by a social group" (D'Andrade, 1989: 809). That is, a cultural model entails that the knowledge that it organizes is shared among members of a community (Holland and Quinn, 1987; Shore, 1996; Kronenfeld, 1996, 2008; Strauss and Quinn, 1997; Quinn, 2005). Third, a cultural model is used in reasoning, in planning actions, and it may motivate action as well (D'Andrade and Strauss, 1992; Holland, 1992). In other words, cultural models construct the mental context, i.e., culture in mind, within which and out of which behavior will be generated.

Where are cultural models located in the mind? Since cultural models vary in complexity and content, they can be located in possibly any major module and domain of knowledge therein of the mind. I restrict my discussion to the partial architecture of the mind introduced in [Figure 1.2](#). Any of the five modules – action, conceptual structures, language, social cognition, and spatial representation – can host a number of cultural models. Besides, some cultural models can span over more than one of those modules and/or domains therein. That is, it may be the composite result or assemblage of some of the content, i.e., knowledge, typically found in a number of domains and sometimes also in more than one module.

These assemblages, or better cultural models, are constructed by each individual while accumulating experiences in one's life. In whatever community they grow and develop, individuals share a human mind and a similar context of experience. Again then, these individually constructed models are cultural because they are very similar and highly shared. In addition, it is not a coincidence that one of the fundamental ontological concepts, space, is assigned a mental module of its own. The representation of spatial relationships plays an essential role in highly mobile living individuals such as human beings. I suggest that a cultural model located in a spatial representation module might as well be replicated in other modules and domains simply because it is generated early in mental development and it is fundamental to subsequent bodily and mental experiences (see Strauss and Quinn, 1997; Mandler, 2004).

In other words, it is true that cultural models can be located in any of the mental modules, and it is also true that they may be firstly generated in ontological domains. However, since spatial representation is the only ontological domain with a clearly defined mental module, it is very likely that a cultural model, i.e., a foundational one, can be located in this module. The overall results of my research that I present in this book robustly confirm and definitely support this last hypothesis.

1.6 A foundational cultural model

A cultural model can exist at various levels of molarity with consequent different degrees of emergent complexity (Brewer, 1987; Shore, 1996; Kronenfeld, 2008). There exists a type of cultural model that though simple in its structure, and maybe because of its simplicity, is repeatedly used. Lakoff (1987) suggests and elaborates the concept of “image-schema” defined as: a way of thinking about one's experience in the world derived from “relatively simple structures that constantly recur in our everyday bodily experience: CONTAINERS, PATHS, LINKS, FORCES, BALANCE, and in various orientations and relations: UP-DOWN, FRONT-BACK, PART-WHOLE, **CENTER-PERIPHERY** [my bold], etc.” (p. 267). Holland and Quinn (1987) argue that a “thematic effect arises from the availability of a small number of *very general-purpose cultural models* [my italics] that are repeatedly incorporated into other cultural models ...” (p. 11). And Shore (1996), after introducing a variety of types of schemas, states: “*Foundational* [my italics] schemas organize or link up a ‘family’ of related models” (p. 53).

I decided to combine the insights of Brewer, Lakoff, Holland, Strauss, and Shore (among others) and label my own conceptual synthesis a ‘foundational cultural model.’ This latter is a basic and simple structure, i.e., an assemblage of knowledge, that can generate other more complex models when used to merge a larger number of units of knowledge. I suggest in this book to compare

it to a ‘cognitive molecule’ (see [Chapter 6](#)). I located one of these potential models in the spatial representation module of Tongans. They prefer to organize mentally spatial relationships by using a specific frame of reference, the radial subtype of the absolute frame of reference (see [Chapter 3](#) for a typology of frames of reference). Besides, I found this preference replicated in a variety of other modules and domains. Then, I called this phenomenon a foundational cultural model and labeled it ‘radiality.’

Radiality is a mental model that is specifically spatial, and since it is shared within a community, i.e., Tongans, it is also cultural. Moreover, since it is repeated in other mental modules and domains therein, it becomes a foundational cultural model. I conceive of radiality as a fundamental cognitive process that is used to organize knowledge across mental modules. Its intrinsic nature is spatial and as such it belongs to the spatial representations module. Tongans, though, preferably adopt/use radiality in other domains of knowledge – exchanges, political action, social networks, religion, kinship, and social relationships – in other modules, including the action module, the social cognition module, and the conceptual structure module. The existence of radiality does not exclude the presence of other foundational cultural models. On the contrary, it suggests the way in which other foundational cultural models could be potentially present and shared in the mind. It suggests the need to look carefully at other ontological domains and see how they are organized. It hopefully points the way to a potentially large number of possible discoveries for the overarching cross-modular and cross-domain organizations of cultural minds.

Finally, I propose here a language metaphor to illustrate culture in mind. Foundational cultural models represent for culture what sentences are for language, they are the fundamental unit of analysis. Besides, they have a syntactic structure and a phonological structure. First, they are constructed syntactically in the limited number of ontological domains (these might also be modules in themselves, e.g., only the content of the ontological domain of space is processed in the spatial representation module). Then, they are further processed and/or utilized phonologically. At this level, the interaction with other knowledge, e.g., kinship, emotions, identity, hierarchy, values, takes place and foundational cultural models become more complex cultural models with emergent properties. Eventually, performance, e.g., behavior, is generated by the ‘phonological’ scenarios (i.e., cultural models) mentally constructed.

1.7 Polynesian selves and cognition

Rooted in Geertz’s (1973, 1980, 1984) suggestions about Balinese culture, and also in the Oceanic and Polynesian literature, “[A]nthropologists typically distinguish between two types of selves – namely, egocentric selves and socio-centric selves – that are cultivated by two types of cultures” (Mageo, 1998: 5).

The first, is a self focused on ego, and the second is a self focused on others or a group. This distinction is fundamental to many contributions to White and Kirkpatrick's (1985) volume titled *Person, Self, and Experience: Exploring Pacific Ethnopsychologies* wherein a sociocentric picture of Pacific, in general, and Polynesian, in particular, psychology emerges. Following the eastward migration of the people that colonized the Polynesian island world (Kirch, 1990), Samoans (Mageo, 1998), Tahitians (Levy, 1973), Marquesans (Kirkpatrick, 1985), and Hawaiians (Ito, 1985) all share the sociocentric self. Tongans, as the Melanesian migrating people who were the first to become Polynesian around 3,200 years ago, also show such a psychological preference (Morton, 1996; Helu, 1999; James, 2002, 2003; and also Kaepler, 1978b; Small, 1997; Evans, 2001; van der Grijp, 2004).

A similar distinction, called collectivism versus individualism, is held in psychology. Triandis (1995) defines them in this way:

Collectivism may be initially defined as a social pattern consisting of closely linked individuals who see themselves as parts of one or more collectives (family, co-workers, tribe, nation); are primarily motivated by the norms of, and duties imposed by, those collectives; are willing to give priority to the goals of these collectives over their own personal goals; and emphasize their connectedness to members of these collectives. A preliminary definition of *individualism* is a social pattern that consists of loosely linked individuals who view themselves as independent of collectives; are primarily motivated by their own preferences, needs, rights, and the contracts they have established with others; give priority to their personal goals over the goals of others; and emphasize rational analyses of the advantages and disadvantages to associating with others. [italics in original] (p. 2)

These extensive and clear definitions can be summarized in exactly the same way as I did for sociocentric and egocentric selves: sociocentrism corresponds to "collectivism" and entails a focus on the group, while egocentrism corresponds to "individualism" and entails a focus on ego (see also Greenfield, 2005).

In 1991, Hofstede reported on a large survey of nationalities (also addressed as cultures) in regard to individualistic and collectivistic psychological posture and behavior. North Americans, Europeans, Australians, and New Zealanders display a high degree of individualistic features (with some variation within the two major groups). Latin Americans, Middle Easterns, Africans, Chinese, Japanese, South-East Asians, and Pacific Islanders instead score high on the collectivistic features (here too there is some variation within the larger groups). Both the anthropological studies and the psychological investigations, then, agree on assigning to Polynesians (a subgroup of the Pacific Islanders) a high incidence of collectivistic psychological stance and behavior.

My personal experience with Tongan and other Polynesian cultures highly resonates with those findings. I started this chapter with an episode that